CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

Unified Industries Incorporated Standards Laboratory	**Fields of Calibration**
7530 Fullerton Court Springfield, VA 22153-2829 Mr. Thomas Rouan Phone: 703-569-0670 Fax: 703-569-5760 E-mail: thomas.rouan@uii.com URL: http://www.uii.com	Electromagnetics – DC/Low Frequency Time and Frequency Mechanical Thermodynamic This laboratory is compliant to ANSI/NCSL Z540-1-1994; Part 1. ((20/A01)

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
ELECTROMAGNETICS – DC/LOW FREQUENCY				
AC RESISTORS and CURRENT (20/E02)				
AC Current – Measure	20 mA	400 Hz 1 kHz 5 kHz	80 µA/A 80 µA/A 80 µA/A	
	30 mA	400 Hz 1 kHz 5 kHz	90 µA/A 90 µA/A 90 µA/A	
	100 mA	400 Hz 1 kHz 5 kHz	100 µA/A 100 µA/A 100 µA/A	
	200 mA	400 Hz 1 kHz 5 kHz	95 µA/A 95 µA/A 95 µA/A	
	300 mA	400 Hz 1 kHz 5 kHz	230 µA/A 230 µA/A 230 µA/A	
	500 mA	400 Hz 1 kHz 5 kHz	185 µA/A 185 µA/A 185 µA/A	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
AC Current – Generate	1 A	400 Hz	150 µA/A	
		1 kHz	150 µA/A	
		5 kHz	155 µA/A	
	2 A	400 Hz	35 µA/A	
		1 kHz	35 µA/A	
		5 kHz	35 µA/A	
	3 A	400 Hz	40 µA/A	
		1 kHz	40 µA/A	
		5 kHz	40 µA/A	
	5 A	400 Hz	45 µA/A	
		1 kHz	45 µA/A	
		5 kHz	45 µA/A	
	10 A	400 Hz	60 µA/A	
		1 kHz	65 µA/A	
		5 kHz	65 µA/A	
	20 A	400 Hz	75 µA/A	
		1 kHz	75 µA/A	
		5 kHz	75 µA/A	
	20 mA	400 Hz	80 µA/A	
		1 kHz	80 µA/A	
		5 kHz	80 µA/A	
	30 mA	400 Hz	90 µA/A	
		1 kHz	90 µA/A	
		5 kHz	90 µA/A	
	100 mA	400 Hz	100 µA/A	
		1 kHz	100 µA/A	
		5 kHz	100 µA/A	
	200 mA	400 Hz	95 µA/A	
		1 kHz	95 µA/A	
		5 kHz	95 µA/A	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
	300 mA	400 Hz 1 kHz 5 kHz	230 µA/A 230 µA/A 230 µA/A	
	500 mA	400 Hz 1 kHz 5 kHz	185 µA/A 185 µA/A 185 µA/A	
	1 A	400 Hz 1 kHz 5 kHz	150 µA/A 150 µA/A 155 µA/A	
	2 A	400 Hz 1 kHz 5 kHz	35 µA/A 35 µA/A 35 µA/A	
	3 A	400 Hz 1 kHz 5 kHz	40 µA/A 40 µA/A 40 µA/A	
	5 A	400 Hz 1 kHz 5 kHz	45 µA/A 45 µA/A 45 µA/A	
	10 A	400 Hz 1 kHz 5 kHz	60 µA/A 65 µA/A 65 µA/A	
	20 A	400 Hz 1 kHz 5 kHz	75 µA/A 75 µA/A 75 µA/A	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Note 3	Remarks
DC RESISTANCE and CURRENT (20/E05)			
DC Current – Measure	3 A	38 µA/A	
	6 A	37 µA/A	
	9 A	38 µA/A	
	12 A	37 µA/A	
	15 A	37 µA/A	
	20 A	16 µA/A	
	40 A	17 µA/A	
	60 A	16 µA/A	
	80 A	17 µA/A	
	100 A	16 µA/A	
DC Current – Generate	3 A	38 µA/A	
	6 A	37 µA/A	
	9 A	38 µA/A	
	12 A	37 µA/A	
	15 A	37 µA/A	
	20 A	16 µA/A	
	40 A	17 µA/A	
	60 A	16 µA/A	
	80 A	17 µA/A	
	100 A	16 µA/A	
DC Resistance – Measure	0.001 Ω	4.7 µΩ/Ω	
	0.01 Ω	2.4 µΩ/Ω	
	0.1 Ω	1.2 µΩ/Ω	
	1 Ω	0.23 µΩ/Ω	
	10 Ω	0.24 µΩ/Ω	
	100 Ω	0.35 µΩ/Ω	
	1 kΩ	0.33 µΩ/Ω	
	10 kΩ	0.33 µΩ/Ω	
	100 kΩ	0.43 µΩ/Ω	
	1 MΩ	1.2 µΩ/Ω	
	10 MΩ	6.9 µΩ/Ω	
DC Resistance – Generate	0.001 Ω	4.7 µΩ/Ω	
	0.01 Ω	2.4 µΩ/Ω	
	0.1 Ω	1.2 µΩ/Ω	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty [Note 3]	Remarks
	1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ	0.23 μΩ/Ω 0.24 μΩ/Ω 0.35 μΩ/Ω 0.33 μΩ/Ω 0.33 μΩ/Ω 0.43 μΩ/Ω 1.2 μΩ/Ω 6.9 μΩ/Ω	
DC VOLTAGE (20/E06)			
DC Voltage – Measure and Generate	100 mV 1 V 1.018 V 10 V 100 V 1000 V	2.2 μV/V 2.1 μV/V 2.1 μV/V 2.1 μV/V 2.1 μV/V 2.2 μV/V	
DC Voltage – Generate	0.1 V to 2.2 V > 2.2 V to 22 V > 22 V to 220 V > 220 V to 1000 V	4.1 E-06 V 2.2 E-05 V 2.7 E-04 V 2.1 E-03 V	

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty [Note 3]	Remarks
LF AC VOLTAGE (20/E09)				
AC Voltage – Measure and Generate	22 mV	10 Hz 20 Hz 40 Hz 100 Hz 1 kHz 10 kHz 20 kHz 50 kHz	80 μV/V 65 μV/V 65 μV/V 65 μV/V 65 μV/V 65 μV/V 70 μV/V 90 μV/V	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
		100 kHz	160 µV/V	
		300 kHz	240 µV/V	
		500 kHz	350 µV/V	
		800 kHz	420 µV/V	
		1 MHz	410 µV/V	
	220 mV	10 Hz	35 µV/V	
		20 Hz	25 µV/V	
		40 Hz	18 µV/V	
		100 Hz	18 µV/V	
		1 kHz	12 µV/V	
		10 kHz	16 µV/V	
		20 kHz	16 µV/V	
		50 kHz	30 µV/V	
		100 kHz	45 µV/V	
		300 kHz	85 µV/V	
		500 kHz	150 µV/V	
		800 kHz	230 µV/V	
		1 MHz	310 µV/V	
	700 mV	10 Hz	30 µV/V	
		20 Hz	25 µV/V	
		40 Hz	12 µV/V	
		100 Hz	14 µV/V	
		1 kHz	14 µV/V	
		10 kHz	14 µV/V	
		20 kHz	14 µV/V	
		50 kHz	14 µV/V	
		100 kHz	18 µV/V	
		300 kHz	30 µV/V	
		500 kHz	55 µV/V	
		800 kHz	85 µV/V	
		1 MHz	120 µV/V	
	2.2 V	10 Hz	30 µV/V	
		20 Hz	16 µV/V	
		40 Hz	6 µV/V	
		100 Hz	7 µV/V	
		1 kHz	6 µV/V	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
		10 kHz	6 µV/V	
		20 kHz	6 µV/V	
		50 kHz	6 µV/V	
		100 kHz	12 µV/V	
		300 kHz	25 µV/V	
		500 kHz	30 µV/V	
		800 kHz	35 µV/V	
		1 MHz	45 µV/V	
	7 V	10 Hz	30 µV/V	
		20 Hz	16 µV/V	
		40 Hz	6 µV/V	
		100 Hz	6 µV/V	
		1 kHz	6 µV/V	
		10 kHz	6 µV/V	
		20 kHz	6 µV/V	
		50 kHz	7 µV/V	
		100 kHz	8 µV/V	
		300 kHz	25 µV/V	
		500 kHz	30 µV/V	
		800 kHz	35 µV/V	
		1 MHz	45 µV/V	
	22 V	10 Hz	30 µV/V	
		20 Hz	16 µV/V	
		40 Hz	7 µV/V	
		100 Hz	7 µV/V	
		1 kHz	7 µV/V	
		10 kHz	7 µV/V	
		20 kHz	7 µV/V	
		50 kHz	8 µV/V	
		100 kHz	12 µV/V	
		300 kHz	25 µV/V	
		500 kHz	30 µV/V	
		800 kHz	35 µV/V	
		1 MHz	50 µV/V	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) [Notes 1,2]

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty [Note 3]	Remarks
	70 V	10 Hz	30 µV/V	
		20 Hz	16 µV/V	
		40 Hz	7 µV/V	
		100 Hz	7 µV/V	
		1 kHz	7 µV/V	
		10 kHz	7 µV/V	
		20 kHz	7 µV/V	
		50 kHz	9 µV/V	
		100 kHz	12 µV/V	
		300 kHz	30 µV/V	
	220 V	10 Hz	40 µV/V	
		20 Hz	16 µV/V	
		40 Hz	9 µV/V	
		100 Hz	9 µV/V	
		1 kHz	9 µV/V	
		10 kHz	9 µV/V	
		20 kHz	9 µV/V	
		50 kHz	12 µV/V	
		100 kHz	18 µV/V	
	1000 V	40 Hz	14 µV/V	
		100 Hz	12 µV/V	
		1 kHz	9 µV/V	
		10 kHz	7 µV/V	
		20 kHz	9 µV/V	
		50 kHz	20 µV/V	
		100 kHz	35 µV/V	
LF CAPACITANCE (20/E10)				
LF Capacitance – Measure	1000 pF	1 kHz	4.2 µF/F	
	100 pF		6.6 µF/F	
	10 pF		16 µF/F	
LF Capacitance – Generate	1000 pF	1 kHz	4.1 µF/F	
	100 pF		5.8 µF/F	
	10 pF		16 µF/F	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Frequency Range	Expanded Uncertainty Note 3	Remarks
PHASE METERS (20/E15)				
Phase Meters – Generate				
10 V (rms)	30° to 360°	60 Hz	0.011º	
		400 Hz	0.011°	
		1 kHz	0.011°	
		2 kHz	0.011°	
		5 kHz	0.011°	
		10 kHz	0.011°	
		20 kHz	0.011°	
		50 kHz	0.011°	
50 V (rms)		60 Hz	0.004°	
		400 Hz	0.004°	
100 V (rms)		60 Hz	0.004°	
		400 Hz	0.004°	
Phase Meters – Measure				
10 V (rms)	30° to 360°	60 Hz	0.026°	
		400 Hz	0.026°	
		1 kHz	0.026°	
		2 kHz	0.026°	
		5 kHz	0.026°	
		10 kHz	0.026°	
		20 kHz	0.026°	
		50 kHz	0.026°	
50 V (rms)		60 Hz	0.024°	
		400 Hz	0.024°	
100 V (rms)		60 Hz	0.024°	
		400 Hz	0.024°	

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

CALIBRATION AND MEASUREMENT CAPABILITIES (CMC) Notes 1,2

Measured Parameter or Device Calibrated	Range	Expanded Uncertainty Note 3,5	Remarks
VOLTAGE TRANSFORMERS (20/E19)			
Voltage Transformers	0 to 1	0.00012 %	Ratio; Actual ratio could be ≤ 1.1
TIME and FREQUENCY			
FREQUENCY DISSEMINATION (20/F01)			
Frequency Dissemination – Measure Generate	 0 MHz to 10 MHz 0 MHz to 10 MHz	 1.6×10^{-8} 3.3×10^{-12}	
MECHANICAL			
FORCE (20/M06)			
Compression and Tension	0.45 kN to 2.22 kN 2.22 kN to 8.90 kN 8.90 kN to 22.24 kN 22.24 kN to 44.48 kN 44.48 kN to 111.21 kN 111.21 kN to 222.41 kN 222.41 kN to 444.82 kN	0.03 % 0.03 % 0.03 % 0.04 % 0.04 % 0.03 % 0.03 %	2.22 kN Deadweight Tester 8.90 kN Load Cell 22.24 kN Load Cell 44.48 kN Load Cell 111.21 kN Load Cell 222.41 kN Load Cell 444.82 kN Load Cell
THERMODYNAMIC			
PRESSURE (20/T05)			
Pressure – Generate	0.069 MPa to 4.83 MPa 2.76 MPa to 11.03 MPa 11.03 MPa to 68.95 MPa	0.005 % 0.005 % 0.0055 %	Pneumatic Hydraulic
RESISTANCE THERMOMETRY (20/T07)			
SPRT	-196 °C -38.8344 °C 0.01 °C 231.928 °C 419.527 °C -196 °C to 500 °C	5 mK 3 mK 1 mK 3 mK 4 mK 19 mK	N_2 Boiling Point Hg Fixed Point H_2O Fixed Point Sn Fixed Point Zn Fixed Point IPRT Compared to SPRT
END			

2024-05-31 through 2025-06-30
Effective dates

For the National Voluntary Laboratory Accreditation Program

CALIBRATION LABORATORIES **NVLAP LAB CODE 200597-0**

Notes

Note 1: A Calibration and Measurement Capability (CMC) is a description of the best result of a calibration or measurement (result with the smallest uncertainty of measurement) that is available to the laboratory's customers under normal conditions, when performing more or less routine calibrations of nearly ideal measurement standards or instruments. The CMC is described in the laboratory's scope of accreditation by: the measurement parameter/device being calibrated, the measurement range, the uncertainty associated with that range (see note 3), and remarks on additional parameters, if applicable.

Note 2: Calibration and Measurement Capabilities are traceable to the national measurement standards of the U.S. or to the national measurement standards of other countries and are thus traceable to the internationally accepted representation of the appropriate SI (Système International) unit.

Note 3: The uncertainty associated with a measurement in a CMC is an expanded uncertainty with a level of confidence of approximately 95 %, typically using a coverage factor of $k = 2$. However, laboratories may report a coverage factor different than $k = 2$ to achieve the 95 % level of confidence. Units for the measure and its uncertainty are to match. Exceptions to this occur when marketplace practice employs mixed units, such as when the artifact to be measured is labeled in non-SI units and the uncertainty is given in SI units (Example: 5 lb weight with uncertainty given in mg).

Note 3a: The uncertainty of a specific calibration by the laboratory may be greater than the uncertainty in the CMC due to the condition and behavior of the customer's device and specific circumstances of the calibration. The uncertainties quoted do not include possible effects on the calibrated device of transportation, long term stability, or intended use.

Note 3b: As the CMC represents the best measurement results achievable under normal conditions, the accredited calibration laboratory shall not report smaller uncertainty of measurement than that given in a CMC for calibrations or measurements covered by that CMC.

Note 3c: As described in Note 1, CMCs cover calibrations and measurements that are available to the laboratory's customers under *normal conditions.* However, the laboratory may have the capability to offer special tests, employing special conditions, which yield calibration or measurement results with lower uncertainties. Such special tests are not covered by the CMCs and are outside the laboratory's scope of accreditation. In this case, NVLAP requirements for the labeling, on calibration reports, of results outside the laboratory's scope of accreditation apply. These requirements are set out in Annex A.5 of NIST Handbook 150, Procedures and General Requirements.

Note 4: Uncertainties associated with field service calibration may be greater as they incorporate on-site environmental contributions, transportation effects, or other factors that affect the measurements. (This note applies only if marked in the body of the scope.)

Note 5: Values listed with percent (%) are percent of reading or generated value unless otherwise noted.

Note 6: NVLAP accreditation is the formal recognition of specific calibration capabilities. Neither NVLAP nor NIST guarantee the accuracy of individual calibrations made by accredited laboratories.

2024-05-31 through 2025-06-30
Effective dates

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